

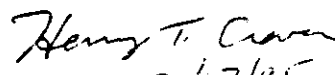


DATA EVALUATION RECORD

1. **CHEMICAL:** Oxine Copper.
Shaughnessey No. 024002.
2. **TEST MATERIAL:** 1) Quinolinate 98; oxine copper or copper 8-quinolinolate; Batch No. 52390; 100% active ingredient; a green powder. 2) ^{14}C -oxine copper; Lot No. 029F9233; specific activity of 92.9 $\mu\text{Ci/mg}$; 98.25% active ingredient.
3. **STUDY TYPE:** 72-1. Freshwater Fish Acute Flow-Through Toxicity Test. Species Tested: Coho Salmon (*Oncorhynchus kisutch*).
4. **CITATION:** Carr, K.A. and G.S. Ward. 1993. Oxine Copper (Copper 8-Quinolinolate): Acute Toxicity to Coho Salmon, *Oncorhynchus kisutch*, Under Flow-Through Test Conditions. Laboratory Project No. J9006014c. Prepared by Toxikon Environmental Sciences, Jupiter, FL. Submitted by LA QUINOLEINE et ses d riv s, S.A., Paris, France. EPA MRID No. 429024-01.
5. **REVIEWED BY:**

Mark A. Mossler, M.S. Associate Scientist KBN Engineering and Applied Sciences, Inc.	Signature:  Date: 11/17/93 Joseph Sybert 2/16/95
Rosemary Graham Mora, M.S. Associate Scientist KBN Engineering and Applied Sciences, Inc.	Signature:  Date: 11/22/93
Henry T. Craven, M.S. Supervisor, EEB/EFED USEPA	Signature:  Date: 2/17/95
7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for an acute toxicity test using coho salmon. Based on mean measured concentrations, the 96-hour LC_{50} of 13.9 $\mu\text{g ai/l}$ classifies oxine copper as very highly toxic to coho salmon. The NOEC was 6.6 $\mu\text{g ai/l}$.
8. **RECOMMENDATIONS:** N/A.
9. **BACKGROUND:**

10. DISCUSSION OF INDIVIDUAL TESTS: N/A.

11. MATERIALS AND METHODS:

A. Test Animals: Coho salmon (*Oncorhynchus kisutch*) were obtained from a commercial supplier in Chateaugay, NY. The fish were maintained in laboratory freshwater for 14 days prior to test initiation. The temperature during the 7-day period prior to test initiation was $12 \pm 1^\circ\text{C}$. Commercial feeds were fed daily during holding. No mortality was observed in the population during the 48 hours prior to test initiation. Mean wet weight and standard length of the control fish were 1.2 (0.64-1.8) g and 41 (36-47) mm at the end of the study. Biomass loading rate was approximately 0.18 g/l/day.

B. Test System: A proportional diluter with a 60% dilution factor was used to prepare the test solutions. The test chambers were 24-l glass tanks containing 15 l of test solution. The test solution depth was 13 cm. The number of volume additions was approximately 9 per day. The test chambers were randomly positioned in a water bath under a 16-hour light photoperiod with a light intensity of 400-600 lux. Fifteen-minute dawn and dusk simulations were employed.

A stock solution containing 0.7% radiolabeled material and 99.3% unlabeled material was prepared in acidified dimethylformamide (DMF). The concentration of oxine copper in the stock solution was 1 mg active ingredient (ai)/ml. The stock was pumped into the chemical mixing chamber with each diluter cycle providing a nominal concentration of $18 \mu\text{g ai/l}$. This solution was proportionally diluted to provide the remaining treatment solutions.

The test dilution water was carbon-treated, filtered (both $5 \mu\text{m}$ and reverse osmosis) city water from the town of Jupiter, FL, which was blended with well water. The water was vigorously aerated prior to use. The water had a hardness of 200-208 mg/l as CaCO_3 and an alkalinity of 47-49 mg/l as CaCO_3 . The specific conductivity was $285 \mu\text{mhos/cm}$.

C. Dosage: Ninety-six-hour, flow-through test. Based on preliminary testing, five nominal concentrations (2.41, 4.01, 6.68, 11.1, and $18.6 \mu\text{g ai/l}$), a solvent control ($17 \mu\text{l DMF/l}$), and a dilution water control were prepared for the definitive test.

- D. **Design:** Twenty salmon were impartially distributed (by twos) to each aquarium, one aquarium per treatment or control. Observations of mortality and sublethal responses were made every 24 hours and dead fish were removed when found. The fish were not fed and the test solutions were not aerated during the study.

The temperature in the water bath was monitored continuously using a minimum/maximum thermometer and a control tank was monitored hourly using a recording device. The dissolved oxygen concentration (DO) and pH were measured in all test solutions (containing surviving fish) daily.

Water samples from each aquarium were collected at test initiation and termination for analysis of the test material. Concentrations of the test material were measured using liquid scintillation counting.

- E. **Statistics:** The median lethal concentration (LC_{50}) and associated 95% confidence interval (C.I.) for each 24-hour interval were calculated using a computer program which employed several computational methods.

12. **REPORTED RESULTS:** The mean measured concentrations were 1.88, 3.61, 6.57, 11.7, and 18.2 $\mu\text{g ai/l}$ (Table 1, attached) and averaged 78 to 105% of nominal.

There was no mortality or sublethal effects in the control or three lowest-concentration treatment groups (Table 2, attached). The 96-hour LC_{50} , based on mean measured concentrations, was 13.9 $\mu\text{g ai/l}$ (95% C.I. = 11.7-18.2 $\mu\text{g ai/l}$) using the binomial probability method. The no-observed-effect concentration (NOEC) was 6.57 $\mu\text{g ai/l}$, based on the lack of mortality or sublethal effects at this level.

During the test, the DO ranged from 6.4 to 9.7 mg/l (59 to 89% of saturation) and the pH values ranged from 7.4 to 8.0. The temperature was 11.2-13.6°C.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No conclusions were made by the author.

Quality Assurance and Good Laboratory Practice (GLP) statements were included in the report, indicating that the study was conducted in accordance with EPA GLP Regulations set forth in FIFRA 40 CFR Part 160.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

- A. Test Procedure:** The test procedures were generally in accordance with the SEP, except for the following:

The dilution water was city tap water which was probably chlorinated before being treated in the laboratory. The use of this type water is discouraged. Since no control mortality was observed, the use of this water probably did not affect the results of the study.

The temperature range (11.2-13.6°C) was greater than recommended (12 ±1°C).

- B. Statistical Analysis:** The reviewer used EPA's Toxanal program to calculate the 96-hour LC₅₀ value and 95% confidence interval (see attached printout) and obtained the same results.

- C. Discussion/Results:** Although the temperature varied by a wide degree, detrimental effects were not manifested in the controls. Therefore, this deviation did not affect the outcome of the study.

This study is scientifically sound and meets the guideline requirements for an acute toxicity test using coho salmon. Based on mean measured concentrations, the 96-hour LC₅₀ of 13.9 µg ai/l classifies oxine copper as very highly toxic to coho salmon. The NOEC was 6.6 µg ai/l.

- D. Adequacy of the Study:**

(1) Classification: Core.

(2) Rationale: N/A.

(3) Repairability: N/A.

- 15. COMPLETION OF ONE-LINER FOR STUDY:** Yes, 11-17-93.

Acute Oxire Copper Study MEID 429024-4

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Pages 5 through 6 are not included in this copy.

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MOSSLER OXINE COPPER ONCORHYNCHUS KISUTCH 11-17-93

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
18.2	20	20	100	9.536742E-05
11.7	20	2	10	2.012253E-02
6.57	20	0	0	9.536742E-05
3.61	20	0	0	9.536742E-05
1.88	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 11.7 AND 18.2 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 13.91007

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE
PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE
NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.
